Bart De Maerschalck[1], Joris Vanlede[1], Arvid Dujardin[2]
Toon verwaest[1]

[1]Flanders Hydraulics Research (Waterbouwkundig Laboratorium),
Berchemlei 115, 2140 Antwerp, Belgium

[2]Antea Group, Poortakkerstraat 41, 9051 Gent, Belgium

Detailed Zeebrugge Hydrodynamic model

Numerical tool as part of an integral approach for accessibility and safety studies

Problem statement:

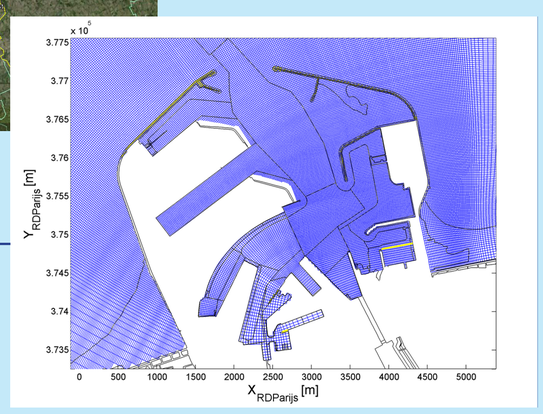
- Accessibility and safety of the port: Strong ebb and flood currents
  -> Limited inbound sailing window for tall ships
- Port maintenance: strong tidally driven siltation of the outer port
  -> continuous dredging activities (> 4 MTons/year)

Project description:

- Development of integral approach for future assessment studies
- Numerical 3D model, physical model and simulator studies

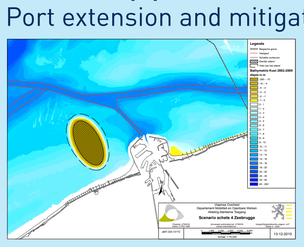
Model description

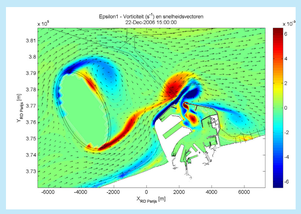
- 3D: 185.000 cells, 6 vertical σ-layers
- Resolution: 30m – 200m, Δt = 3sec
- Turbulence model: k-ϵ
- Validation: Meetnet Vlaamse Banken, In situ measurements
  (fixed ADCP and sailed transects: MVB, Flanders Hydraulics Research)



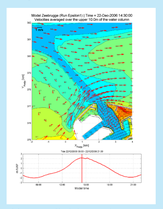
Model applications

- Port extension and mitigation assessments

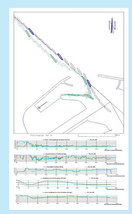




- Input real/fast-time simulator

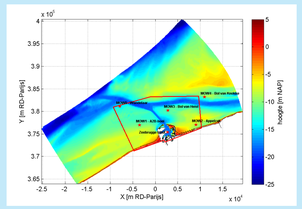


Vector fields and water levels derived from Numerical model

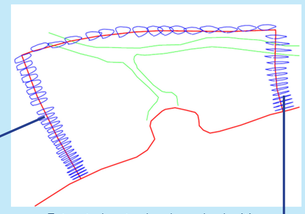


Simulated ship manoeuvring

- Input physical model



Boundaries physical model projected into numerical model



Extracted water levels and velocities on physical boundaries

Steering pumps and valves physical model (Flanders Hydraulics, Antwerp)

www.watlab.be

anteagroup

department Mobility and Public Works